

Accelerator Systems Division Highlights for the Week Ending March 23, 2001

ASD/LBNL: Front End Systems

ASD/LANL: Warm Linac

The first crate of 402.5-MHz waveguide was shipped from the manufacturer today. Delivery to the RATS building is anticipated within 1-2 weeks. (WBS 1.4.1.1)

The first prototype 600-kW SRF RF loads arrived this week (Fig. 1). High-voltage and high-power tests are underway. (WBS 1.4.1.1)

Our formal response to the LLRF FDR is complete and is being submitted to SNS. A preprint is currently available at http://sns.atdiv.lanl.gov/pdf/des/RF_Controls_FDR_response1.pdf (WBS 1.4.1.3)

The coils for the prototype EMD (Fig. 2) arrived this week and are in the process of being tested and mapped. The black coating on the pole pieces and coils is composed of Aluminum-Titanium-Oxide, which will be used to insulate the coils. The aluminum mold, shown in the upper left, will be used to pot the prototype coils, which is expected to begin next week. The EMD prototype is currently on schedule. (WBS 1.4.2)



Fig. 1: Prototype 600-kW SRF load installed in the LANL RF test stand and undergoing evaluation tests.

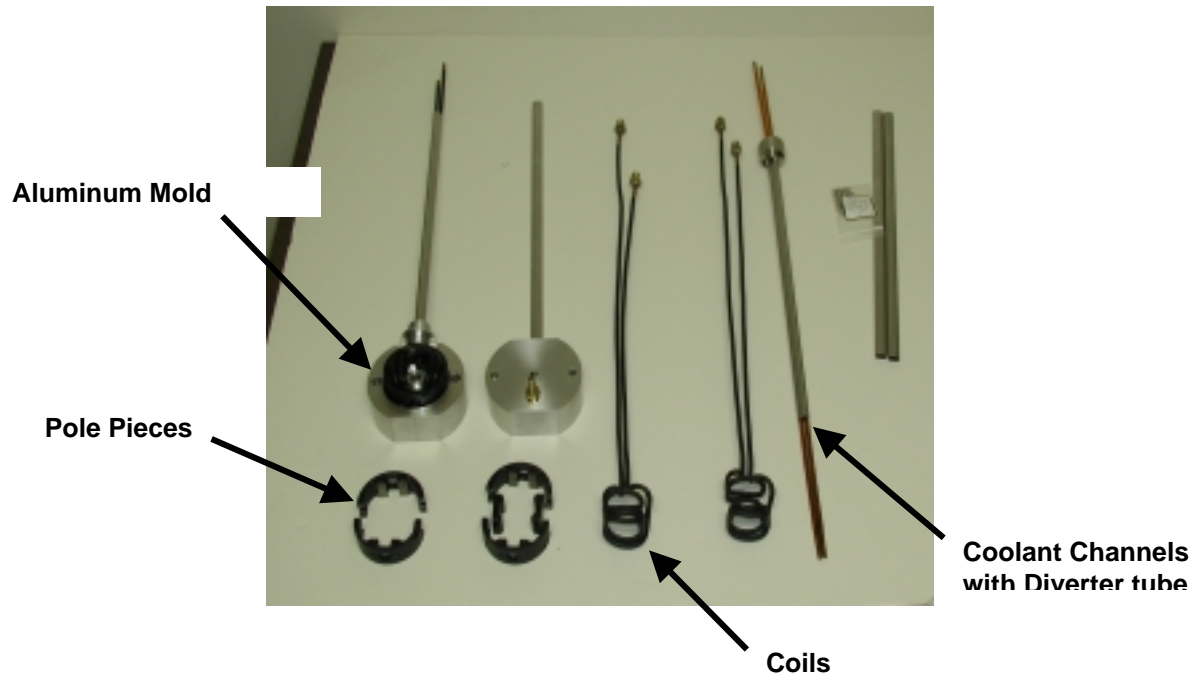


Fig. 2 – Prototype SNS electromagnetic dipole components.

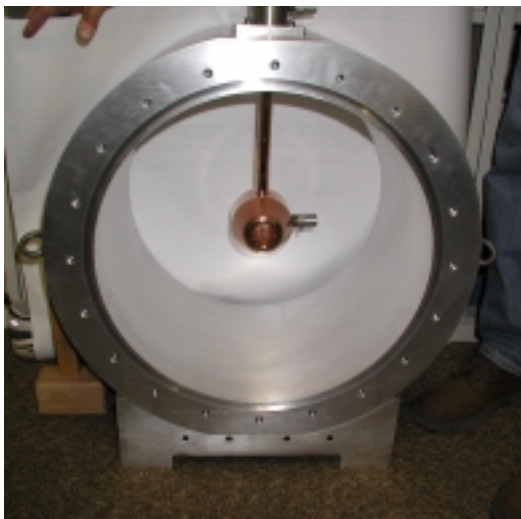


Fig. 3: Testing fixture for dynamic experiments and the high-energy prototype drift tube with accelerometer

We vacuum tested the low-energy prototype drift tube and found several vacuum leaks in the welded bellows. These leaks could be a result of mishandling (either by security officials at the Knoxville airport after ASAC or the manufacturer). This prototype reflects the state of our design at PDR. The current drift tube design does not

include a bellows and has an additional o-ring seal. The low energy prototype drift tube is now at manufacturer where it will be retrofitted to incorporate our most recent modifications. Bids on the production PMQ drift tubes are expected back by the second week of April. (WBS 1.4.2.3)

We began dynamic testing the drift tube and drift tube mount to validate our numerical models (Fig. 3). These experiments will provide insight in to issues associated with damping, and the drift tube response to flow induced excitation, an issue raised by at the last ASAC meeting. (WBS 1.4.2.3)

The forgings for the DTL are currently ahead of schedule and should be completed by the end of next week (3/30/01). We are in the process of evaluating potential machine shops for the final machining. (WBS 1.4.2.6)

Our collaboration with Saclay to address ASAC issues continues. Three colleagues (J-M. Lagniel, N. Pichoff, D. Urot) completed a productive two-week work session at LANL. Accomplishments are as follows: (1) The SNS linac design (with PARMILA) was transcribed to a design file compatible with the Saclay PARTRAN code. (2) Excellent agreement in the emittances and phase space distributions between PARTRAN and PARMILA is observed for beam dynamics simulations through the end of the CCL with an RFQ beam generated with the TOUTATIS code. (3) The SRF linac was redesigned for enhanced E-field (37.5 MV/m) for the high- section and a new phase law (-22 degree). (4) The matching was optimized at the CCL-SRF interface, and at the medium-beta-high-beta interface for the high-field SRF linac. (5) Probable output energy distribution for 10000 probable scenarios were generated. (6) We began beam dynamic studies involving nonlinear coupling resonances that can induce emittance exchanges. The frame-work for description of beam with reduced set of parameters, tune diagrams, stability charts for coupling resonances for given tune spreads including multiparticle simulations are some of the areas that are being studied. (WBS 1.4.5.3)

PCRs LI 01 031 (Cost Variance for SRF Transmitters), LI 01 021 (LANL Project Management), and LI 00 052 (DTL Cold Model) were accepted this week. PCR LI 00 065 (LANL change of station at JLab) was modified to include detailed job descriptions of LANL engineers working at JLab. Two new PCRs were drafted: LI 01 044 (Additional Cost for Conventional Facilities Interface) and LI 01 045 (Cost Savings on second 550 kW Klystron Contract). (WBS 1.4.6.1)

LANL hosted a cabling workshop this week with ORNL, BNL, and the AE firm. J. Cleaves (ORNL) led the workshop, and LANL invested 0.05 FTE of unscheduled, unbudgeted work in participation that day. Findings and recommendations will be presented at the 75% Title-II FELK design review at the AE firm next week.

ASD/JLAB Cold Linac

The 3rd, 4th, & 5th Gas Storage Tanks were delivered to the site. The last 3 Gas Storage Tanks are scheduled to be delivered at ORNL on March 28.

The MB #2-4 cavity frequency measurements of the dumbbells continue to be made. The HB #5 pinhole in the equator weld was repaired.

Preparations continue for the high power test next month at LANL. The second outer conductor pair was received.

Welding the single cell MB Nb and the remaining cavity ends continues. ORNL is calculating the HOM modes for a three cavity CM system, since the troublesome "36" mode is very end condition dependent

Activities continue for the identification of the three high beta HOM modes considered dangerous for power generation if not sufficiently damped.

The procurement effort for the EP parts and the cabinet continues.

The Tuner Mechanical bids, the Space Frame bids, and the Magnetic Shield bids are all being evaluated. We plan to award at least three of the four before the end of the month. The Vacuum Tank bids are due back by 26-Mar. Reactor grade Nb bids are due back by 9-Apr. Cavity ends bids are due back by 16-Apr.

The installation cost PCR for the 1MW RF system is being prepared (LI 00-068).

ASD/BNL: Ring and Beamlines

Tom Mason, Norbert Holtkamp, Carl Strawbridge and Bob Kustom were at BNL for a world-wind one-day visit. The “all-hands” meeting conducted by Mason and Holtkamp was enthusiastically received by all members of the BNL/SNS staff.

On March 13, Joe Tuozzolo and Jim Rank conducted an “internal” Progress Review of the extraction region from the Lambertson magnet to the first (21cm) quadrupole. Minutes of this meeting were submitted to the Rudy Damm earlier this week.

Drawings are being reviewed in preparation for the conventional review scheduled for next week in California. Tom Nearing and P.K. Feng will attend for Brookhaven.

The 21Q40 quad, with 1.3 GeV steel and coils, was assembled and is being set up in the new low power test stand for field quality measurements. See photo below.



Work continued on the assembly of the first RF Cavity. The second of two tanks was set on the support stand this week. See photo below.



Engineers traveled to Apogee Labs (Pa.) to conduct analog testing of the power supply interface (PSI) module. These tests went well and the first production article is expected before 6/01/01.

Bob Lambiase is making plans to meet with our vendor, Danfysik, on 3/29/01 to review engineering requirements related to the Low Field Power Supplies (LFPS).

Arrangements are being made with the Project Office to conduct a final design review of five magnet assemblies on April 12. The assemblies include 26Q40, 30Q44, 31Q58, Injection Kicker and the Injection Septum Magnets. This FDR is being coordinated with the Ring Systems Handoff meeting that is scheduled for April 10 and 11 at BNL.

ASD/ORNL: Integration

Accelerator Physics

S. Danilov attended a meeting at SLAC on VLHC issues. He discussed work on impedance issues relating to instabilities and halo production.

The applications programming server software was upgraded to be consistent with the controls group EPICS server. The official controls group EPICS distribution is available now on this server, facilitating application prototyping and with maintaining consistency in software releases with the controls group.

Calculations on the DTL dark current generation were performed for consideration in the FE building occupancy guidelines.

Operations

Installation and RATS Building

Magnet Measurement Group

An order has been placed with an outside vendor for one Quadrupole measurement coil and drawings for another. We are also starting to setup in the RATS building.

Ion Source Group**RF Group**

Agreement was reached with Los Alamos on DI water reduction for the warm linac. For the SC linac we could not find mutual ground.

A Job offer has been made for a LLRF engineer.

We are trying to get a better understanding of the control system 1st SC transmitter review at Maxwell April 19 & 20.

Coupler testing with 20 kW CW RF at JLAB will start later part of next week. Preparation with cleaning and assembling parts for the testing is progressing.

After arrival this week of the -80 kV CWDD power supply, including the controls cabinet, SCR controller, and crowbar cabinet, we will be evaluating the suitability of the system for use as a test stand for 550 kW klystrons and associated HPRF equipment.

The final assembly of the NGITS (Next Generation IGBT Test Stand) has been completed this week.

Cryo Transfer Line Group

Three more helium gas storage vessels have arrived from Trinity Industries. That brings the total now on site to 5 of the 8. The remaining 3 tanks are scheduled for delivery on Tuesday 3/27.

We continue to spot and anchor the equipment in the transfer line area. The welding machine will have AC power on Monday 3/26.

Searching through ORNL salvage this week has yielded a welding table for the weld development area, and several mechanical vacuum pumps were also rescued from salvage. These will be used as roughing stations for pipe vacuum certification tests in the Transfer line development area.

The bids for remove of the Liquid nitrogen purifier from the Y-12 coil test facility returned higher costs than anticipated. A second meeting is being requested of the vendors to review the scope of work and try to understand the variance.

We continue to order tools and equipment to complete the installation of the transfer line development area.

WE have completed the design of the de-ionized water wash area for the vacuum pipes and are ordering parts for installation.

David Vandygrif, our last technical hire was here Friday for his pre employment physical, he also spent an additional day here with the controls people to get a jump-start on his work prior to full time employment.

The warm helium compressors for the CHL will be stored in the RATS building when they arrive in June. This will afford us the opportunity to work on the control interfaces and maintain the rotating equipment while in storage.

Mechanical Group**Power Supply Group**

A PCR for standard Power Supply Interface is in process and Dave Gurd is looking into CSDB with Randy Musick to cover LANL magnet power supplies.

Bob Lambiase (BNL) and Jack Gioia (LANL) are leaving next week for Denmark for a design review for corrector power supplies.

Jack Gioia (LANL) submitted this week revised power supply load and cable and DI water sheets and they were implemented into the CF load sheets for SF meeting.

Time was spent for ring power supply building revisions in preparation for next week SF meeting.

Survey and Alignment Group

Diagnostics Group

BPM: LANL initiated the order for 40 additional Kaman feed throughs for the DTL BPMs. We have a rough draft response to the BPM PDR review committee. Work has begun to design the mounting fixture needed to test the DTL BPM pickups. BNL shops have completed fabrication of all parts for the first article 21cm HEBT PUEs, and they continue fabrication of the first article 12cm HEBT PUEs. Drawings for 30cm Ring PUEs are in checking. Material orders for all HEBT, Ring, and RTBT BPM assemblies were reviewed by shops. Considerable cost savings resulted from improved manufacturing methodology. Scattering parameters were measured for feedthru samples and found to be satisfactory. Visual inspection was also satisfactory.

BLM: Continued the analysis of the data from the g-2 Loss Monitor response. A preliminary ICD draft was written and circulated for comments

BCM: Work on the ICD and the AFE layout continues. Familiarization with Logic Analyzer and Pattern Generator used to analyze the AFE/digital board interface progressed well. Effort was given to design of the gain control circuit.

Tune: Prepared a presentation on tune measurement for the Ring AP group weekly meeting.

Carbon Wire Scanner: BNL continues preparation of response to Design Review Action Items continues. MEBT wire scanner engineering drawings were reviewed and detail drawings are in progress. Design efforts on MEBT carbon orifice for 'pencil beam' have resumed. LANL received the actuator quote from Huntington. It includes the limit switches, the LVDT, the brake, and the connectors. The price is reasonable, and we will now proceed to order one for testing. Detailing work on the SCL WS actuators continues.

Laser Wire Scanner: BNL personnel prepared and presented a poster on the laser wire for the Mason/Holtkamp/Strawbridge visit. Emphasis was on clear advantages over carbon wire, and the possibility of making the laser wire the primary profile diagnostic for H-minus beams. An assembly drawing for the MEBT laser-wire platform was completed, and sent to LBL to confirm the absence of interference. All optical components are mounted on a plate, which can be attached to any of the MEBT beam-scanner chambers. ORNL and LBNL personnel discussed the possibility of laser wire testing during Front End commissioning.

Slits and Energy Degradors: Choice of materials for slits and degraders will likely be graphite, except for the D-plate absorber, which will likely be made from Be. We may have to change to a denser material for the high-energy degraders to keep the longitudinal dimension to a manageable length. Our design for the energy degrader and Faraday Cup actuators will likely be based on the air actuators developed for LEDA. We have received preliminary price quotes for these that look very reasonable. We are now checking to see if we can use the same basic design for all locations.

D-plate: LANL completed the COSMOS modeling of the support structure. Based on this analysis we will use stronger tubes at the top of the structure. Design work on the beam stop continues.

SCL inter-segment regions: The new layout with the BPMs attached to the beam boxes is now fairly solid. All diagnostics, alignment, vacuum, and installation requirements can be met with this layout. This will likely be the final solution.

Global: At LANL, work continued on the work package revisions. Matt Stettler has completed the DMA controller simulations for the BPM/BCM PCI card, and expects to begin actual hardware assembly and test soon. Jeff Hill has agreed to provide Matt and Lisa the latest copy of the portable channel access server. These will be integrated into DLLs that may allow more uniformity between Windows and Linux based instruments. Dave

Purcell and Saeed attended NT Embedded training at the Microsoft campus. Tom, Dave and Saeed visited LBNL and discussed the following topics: applications and personnel desired for Front End commissioning, the current EPICS installation at LBNL, simplified LLRF electronics for Front End commissioning, a waveform qualification system for MEBT chopper target protection. Tom presented an overview of the event link and real time data link.